

SYSTEMATIC REVISION OF TROPICAL ASIAN FRESHWATER GLASSPERCHES (AMBASSIDAE), WITH DESCRIPTIONS OF THREE NEW SPECIES

Tyson R. Roberts*

ABSTRACT

Continental fresh waters of tropical Asia are inhabited by 5 genera and 15 freshwater species of the predominantly marine percomorph family Ambassidae (formerly known as Chandidae). Pakistan has 3 species; India has 6; Nepal, Bangladesh, Burma, Thailand, and Cambodia each have 4; and Indonesia has 6. These fishes are notably diverse, including two specialized monotypic genera of scale-eaters and one scale-less genus in which males have greatly expanded and colorful dorsal and anal fins. Three new species are described, *Gymnochanda flamea* from southern Borneo, *Parambassis tenasserimensis* from the biogeographic ally isolated Tenasserim basin in southeastern Burma, and the elegant *Parambassis vollmeri* from the Salween basin of Burma and Thailand. Significant range extensions include *Parambassis lala* (previously known only from Pakistan, India, and Bangladesh) from the Irrawaddy basin and *Parambassis apogonoides* (previously known only from Indonesia) from the Pahang basin in peninsular Malaysia and the Mekong basin in Cambodia and southern Laos (below Lee Pee Waterfalls).

INTRODUCTION

Marine and freshwater Ambassidae were last revised by FRASER-BRUNNER (1955). Several species have been discovered since then, and much more has been learned about geographical distribution and biology, especially of the freshwater forms. Endemic freshwater glassperches or Ambassidae occur in Madagascar, the Australian region (including New Guinea), and tropical Asia. They are most numerous in India and Borneo. Ambassidae is the only secondary freshwater family of percomorph fishes in tropical Asia in which freshwater forms are morphologically and biologically more diverse than marine ones. The freshwater forms include the largest and the smallest members of the family in Asia; the only ones known with highly specialized dentition and feeding habits (i.e., the scale-eating genera *Paradoxodacna* and *Chanda*); the only known oral-brooding species (*Parambassis apogonoides*); and the only forms with filamentous fins or marked sexual dimorphism (*Gymnochanda*). Whereas nearly all marine species have large scales (usually around 30 in lateral series), freshwater forms range from the scaleless *Gymnochanda* to *Chanda* with very fine scales (125 in lateral series). The range in number of dorsal and anal fin rays also is greater in freshwater forms, as is the number, size, and distribution of serrations on headbones.

*Research Affiliate, Smithsonian Tropical Research Institute

Many Indo-Pacific marine ambassid species with large scales and relatively short upturned jaws enter freshwater, but only in the lowermost or tidal portion of rivers and in relatively isolated rivers (e.g., on islands). Thus they are not characteristic elements of the continental Asian freshwater fish fauna. This paper is concerned only with the endemic freshwater forms. So far as I have been able to ascertain, the species treated herein do not inhabit marine, estuarine or brackish waters, although several sometimes occur in strongly tidal but still largely or entirely freshwater habitats.

MATERIALS AND METHODS

Specimens examined are deposited in the following institutions: ANSP, Academy of Natural Sciences, Philadelphia; BMNH, British Museum of Natural History, London; CAS, California Academy of Sciences, San Francisco; MCZ, Museum of comparative Zoology, Cambridge; MNHN, Muséum National d'Histoire Naturelle, Paris; RMNH, National Natuurhistorisch Museum, Leiden; MZB, Museum Zoologicum, Bogor; USNM, National Museum of Natural History, Washington, D.C.; ZMA, Zoological Museum, Universitet van Amsterdam; and ZRCS, Zoological Reference Collections, National University of Singapore.

There has been considerable confusion about the distribution of freshwater species of Ambassidae, especially in India, often due to misidentified specimens and erroneous locality records. I have tried to rectify this by collecting fresh material and by examining and reidentifying older material in many museums. Unfortunately locality data for many lots is vague or dubious, and I have felt obliged to exercise discretion in deciding whether to report them. Thus BMNH has old lots of *Chanda nama* and *Parambassis lala* supposedly collected in Ceylon (Sri Lanka), where probably neither occurs. In some instances, the correctness of the localities has been queried by earlier workers in the catalogues or on the bottle labels. Many lots bearing relatively uninformative locality data such as "India" are not included under material examined, even though they were examined and re-identified by me.

Readers familiar with systematic papers on Asian freshwater fishes will notice the relatively large amount of material that has been identified and reported upon. It is particularly important to record well documented and identified material from numerous localities in view of the widespread disappearance of many species and the paucity of reliable distributional information. For this reason also it is essential to record the date of collection and collector, so that we can know not only where species occurred, but when they occurred there. The name of the collector helps establish provenance of the specimens and provides a means of confirming locality data and dates of collection.

Older specimens usually are accompanied by minimal locality data. The most useful item in reporting locality data for freshwater fishes generally is the name of the river basin, but this is seldom stated for older specimens. Instead, there may be a poorly legible locality, or unfamiliar spelling of a place name. I tend to refrain from reporting specimens with dubious or illegible locality data. And while some editors insist on up-dating locality data on old museum specimens, I feel this is a serious waste of time and a misguided effort. Modernizing old localities is fraught with potential misinterpretations and errors. In many instances there is no modern geographical equivalent for old geographical terms.

Original locality data (including spelling) is part of the provenance of specimens, and should not be altered at the whim of an author, editor, or data-banker. To cite just one particularly egregious error, an editor who insisted on using only the most modern geographical place names changed the spelling of the Meklong River to Mekong throughout one of my papers. Fortunately it was possible to correct this particular mistake in the page-proofs. When it seems that up-dating or otherwise improving locality data would be useful and unlikely to introduce error I give the additional information or interpretation in brackets, sometimes with a question mark.

The nomenclature for head serrations in Ambassidae was established by FRASER-BRUNNER (1955). In Ambassidae the membranous tubules of the cephalic laterosensory system are greatly enlarged and exposed. The bony laterosensory canals on the preorbital, suborbital, and preopercular bones have become open troughs with both margins often bearing serrae (bony projections resembling saw-teeth). These margins are called edge and ridge by FRASER-BRUNNER.

SYSTEMATIC ACCOUNT

Chanda Hamilton, 1822

Chanda Hamilton, 1822:103, 370 (placed on Official List of Generic Names in Zoology; type species *Chanda nama* Hamilton, 1822, by designation of ICZN: Opinion 1121).

Hamiltonia Swainson, 1839:176 (type species *Hamiltonia ovata* Swainson, 1839 = *C. nama* Hamilton, 1822; placed on Official Index of Rejected and Invalid Generic Names in Zoology: Opinion 1121).

Bogoda Bleeker, 1853:89 (type species by absolute tautonomy *Chanda bogoda* Hamilton 1822 = *Chanda nama* Hamilton 1822).

Diagnosis (modified from ROBERTS, 1989:159-60). — The specialized lepidophagous or scale-eating genus *Chanda* differs from all other ambassids in having a strongly projecting lower jaw; preorbital edge with 4 serrae, ridge non-serrate except for primary serra; cheek, gill cover, predorsum above lateral line and body just below base of dorsal fin scaleless; scales on body very small, about 125 in lateral series; posterior nostril vertically oval, about twice as large as anterior nostril. It differs from all other ambassid genera except the scale-eating *Paradoxodacna* in having enlarged jaw teeth in two main rows, teeth in outer row with strongly curved crowns directed laterally and those in inner row with similarly curved crowns directed medially. Further distinguishing characters are gill rakers on first gill arch 5+13 = 18; dorsal fin soft rays 15-17, anal 14-17; pectoral fin rays 13; a vertically elongate humeral spot; vertebrae 10+15 = 25 (rarely 10+16 = 26). Only a single species known.

Chanda nama Hamilton, 1822

Chanda nama Hamilton, 1822:109, 371, pl. 39, fig. 37 (type locality “ponds throughout Bengal”).

- Chanda phula* Hamilton, 1822: 111, 371 (type locality "north-eastern parts of Bengal").
Chanda bogoda Hamilton, 1822: 111, 371 (type locality "north-eastern parts of Bengal").
Ambassis oblonga Cuvier in Cuvier & Valenciennes, 1828: 185 (no type locality).
Ambassis nama, Cuvier in Cuvier & Valenciennes, 1828: 185.
Ambassis phula, Cuvier in Cuvier & Valenciennes, 1828: 186.
Ambassis bogoda, Cuvier in Cuvier & Valenciennes, 1828: 187.
Hamiltonia ovata Swainson, 1839: 176 (replacement name for *Chanda nama* Hamilton 1822). Placed by ICZN on Official Index of Rejected and Invalid Specific Names in Zoology (Opinion 1121).
Bogoda nama, Bleeker, 1853: 89.
Hamiltonia nama, Fraser-Brunner, 1955: 209.

Type material examined. — MNHN 2952, 49.7 mm (holotype *C. oblonga*).

Non-type material examined. — MCZ 25166, 7:24.9-36.7 mm, Chenab R., Indus basin, Punjab, Pakistan, M. M. Carlton; ZMA 115.948, 2:41.6-48.5 mm, Pakistan, Manha (Manka?) Canal, Sept. 1977, M. Sadiq; MCZ 9711, 9:26.7-37.2 mm, and 9712, 8:17.0-50.8 mm, Sursutiu R., N India, M. M. Carlton; BMNH 1889.9.26.1-9, 9:38.4-45.1 mm, Deoli, Rajputana, F. Day; BMNH 1889.2.1.2831-35, 6:39.0-71.1 mm, Assam, F. Day; BMNH 1889.9.26.1-9, 9:37.6-45.0 mm, Deoli, Rajputana, Col. Biddulph; MCZ 9716-17, 12:16.6-32.3 mm, Ghugger R., M. M. Carlton; CAS 79070, 364: 13.1-59.8 mm, riverside pools and fish ponds near Sonepur, Mahanadi basin, Orissa state, 20-21 Feb. 1985, T. R. Roberts; BMNH 1938.2.22.129-131, 3: 40.2-41.3 mm, Godavery R. headwaters, Deolali, Nasik dist., Bombay Presidency, no date, Bombay Nat. Hist. Soc.; CAS 79071, 7: 40.8-52.2 mm, Tungabhadra River at Hampi, Krishna basin, Karnataka state, 3 Feb. 1985, T.R. Roberts

Diagnosis. — Same as for genus.

Comments. — As with all of Hamilton's fishes, *Chanda nama* was described on the basis of a drawing. *Chanda phula* and *C. bogoda*, however, were described by Hamilton without the benefit of his original drawings of these two nominal species, which, with other Hamilton drawings, had been retained by the Government of Bengal (HORA, 1929:171). Thus there are no holotypes for these three nominal species. *Chanda phula*, *C. bogoda* and *A. oblonga* have been regarded as junior synonyms of *Chanda nama* (DAY, 1875: 50; FRASER-BRUNNER, 1955: 209). Day discussed the synonymy of *C. phula* and *C. bogoda* with *C. nama*, comparing Hamilton's original descriptions of the nominal taxa in some detail, but apparently neither Day nor Fraser-Brunner saw Hamilton's original drawings of *C. bogoda* and *C. phula*, nor did they examine the type material of Valenciennes's *A. oblonga*. Hamilton's drawings of *C. phula* and *C. bogoda* have been published in HORA, 1929, pl. 20, figs. 1 and 3. Having examined these figures and also the holotype of *A. oblonga*, I confirm the synonymy given by Day.

Distribution. — *Chanda nama* definitely occurs in the Indus, Ganges, Mahanadi, and Krishna, and perhaps other river basins in India. Records from Burma probably erroneous.

Records from Malaya erroneous.

***Gymnochanda* Fraser-Brunner, 1955**

Gymnochanda Fraser-Brunner, 1955:210, fig. 4 (type species *Gymnochanda filamentosa* Fraser-Brunner, 1955, by original designation and monotypy).

Gymnochanda Boeseman, 1957:75, pl. 3 (type species *Gymnochanda filamentosa* Boeseman 1957, by original designation and monotypy).

Comment on name. — Marinus Boeseman informed me some years ago that he had quite independently of Fraser-Brunner chosen the same name for his new fish. Given the most obvious distinctive characters of the fish, it is readily understandable how this could happen.

Diagnosis. — *Gymnochanda* differs from all other ambassids in having body entirely scaleless, and first four dorsal and anal fin rays of males greatly elongated or filamentous. Humeral spot absent. Vertebrae 8+17 = 25. Two species, one from the southern Malay peninsula and western Borneo (Kalimantan Barat), the other recently discovered in southern Borneo (Kalimantan Tengah).

***Gymnochanda filamentosa* Fraser-Brunner, 1955**

Gymnochanda filamentosa Fraser-Brunner, 1955: 210, fig. 4 (type locality "southern Malaya"; aquarium specimens).

Gymnochanda filamentosa Boeseman, 1957: 75, pl. 3 (type locality "Singapore?"; aquarium specimens).

Type material examined. — BMNH 1992.11.23.1-6, 6: 14.5-18.5 mm (all males), "South Malaya: presented by Capt. M.A.W. Davies and Raffles Museum" (types of *G. filamentosa* Fraser-Brunner); RMNH 20902, 28.5 mm, Singapore? (holotype *G. filamentosa* Boeseman); RMNH 20888, # 0: 13.1-25.6 mm, Singapore? (paratypes *G. filamentosa* Boeseman).

Non-type material examined. — ZRCS 308, 4: 18.7-23.0 mm, Johore, Kluang, March 1955, H.K. Tong; CAS 49441, 8:23.4-29.1 mm, Sungai Melawi and mouth of Sungai Pinoh at Nangapinoh, Kapuas basin, 21-26 July 1976, T. R. Roberts & Soetikno.

Diagnosis. — *Gymnochanda filamentosa* differs from *G. flamea*, new species, its only congener, mainly in coloration and size. Body transparent or translucent yellowish or yellowish-brown in life, filamentous rays of sexually mature males milk-white distally (ROBERTS, 1989: 160); to 32 mm.

According to the original description by Fraser-Brunner, the filamentous fins of *G. filamentosa* are sexually dimorphic, characteristic of the males only. This finding was

based on the observations of living fish by a Capt. M. A. W. Davis, including the comment that "the males displayed to the females and to each other by vibrating and spreading the unusual rays of the dorsal and anal fins" (in FRASER-BRUNNER, 1955: 212).

Distribution. — *Gymnochanda filamentosa* is known only from the southernmost part of Malay peninsula (Johore) and Kapuas basin of western Borneo (Kalimantan Barat).

Gymnochanda flamea new species

Figure 1

Syntypes. — ZRCS 22861-66, 6: 14.4-18.8 mm, MNHN 1992.1055, 78: 11.6-22.5 mm, Danau Sembuluh at Bangkal, Seruyan basin, Kalimantan Tengah, 12-13 June 1992, T.R. Roberts (syntypes sent to MZB and USNM from MNHN series).

Diagnosis. — *Gymnochanda flamea* differs from its only known congener, *G. filamentosa*, mainly in coloration and size. Live fish are transparent or translucent, with little or no yellowish tint; males have pelvic fins and filamentous extensions of dorsal and anal fins red; concentrations of red chromatophores also on snout, predorsum, and spinous dorsal fin; body depth 2.3-2.7; largest specimen (male) only 22.5 mm (vs 32 mm for *G. filamentosa*); largest female 16.9 mm.

Sexual dimorphism. — The MNHN series of 78 specimens represents a population sample of breeding fish. It consists of 39 males, 13.1-22.5 mm; 23 females, 13.3-16.9 mm; and 16 young, sex undetermined, 11.6-14.0 mm. The 12 largest specimens, 18.1-22.5 mm, are all males with long filamentous extensions of both dorsal and anal fins. They have up to 5 or 6 thin vertical bars on the body and bright red coloration in life. All males with filaments on both fins. All females apparently gravid or with ripening gonads; largest females gravid or at least with well developed ovaries: presence of eggs verified by dissection in ten specimens. A female of 16.5 mm with 15 eggs of about 0.6 mm and a few much smaller eggs. Females and young without filamentous fins, largely transparent, without faint vertical bars or red color.

Food habits. — Dennis H. Murphy of the Zoology Department, National University of Singapore, kindly examined stomach contents of five *G. flamea*, 17.7-19.8 mm, from Danau Sembuluh. He found they had been feeding mainly on midwater animals, predominantly Cladocera of several species (present in stomachs of all five). One had fed on midwater copepods (calanoids), several on midwater swimming Hemiptera (corixids and pleids). The only other food items found were a single top-floating dipteran and a single bottom-living mayfly. Food habits of *G. filamentosa* in nature unknown.

Distribution. — *Gymnochanda flamea* is known only from the type locality, Danau Sembuluh, Seruyan basin, south Borneo. This is a large, shallow, dendritic lake, without tidal fluctuations; water slightly murky but definitely not black; pH not recorded.

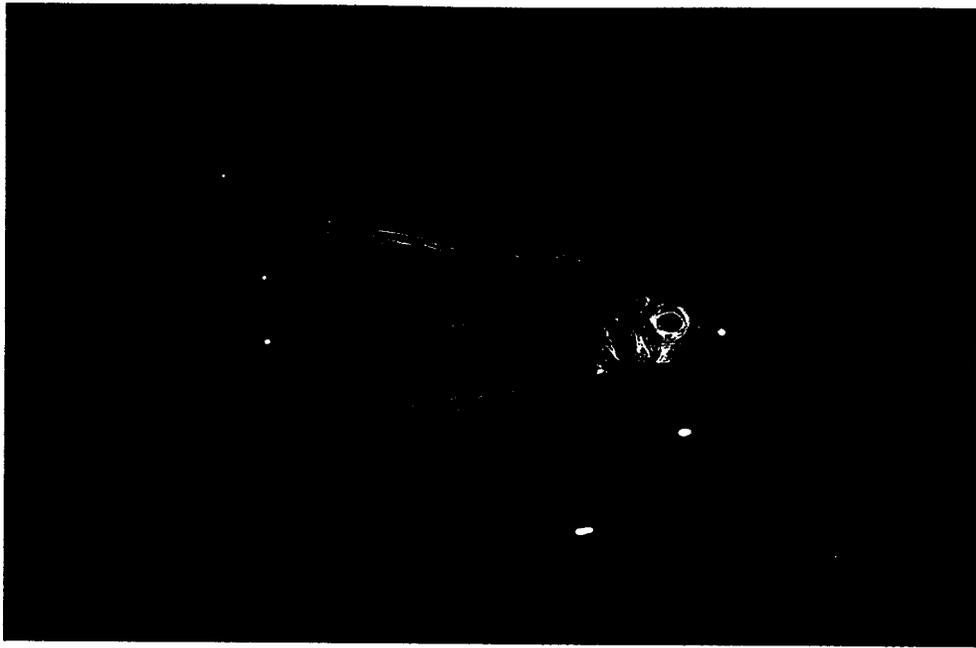


Figure 1. *Gymnochanda flamea*, Danau Sembuluh (syntype).



Figure 2. *Paradoxodacna piratica*, Danau Sembuluh.

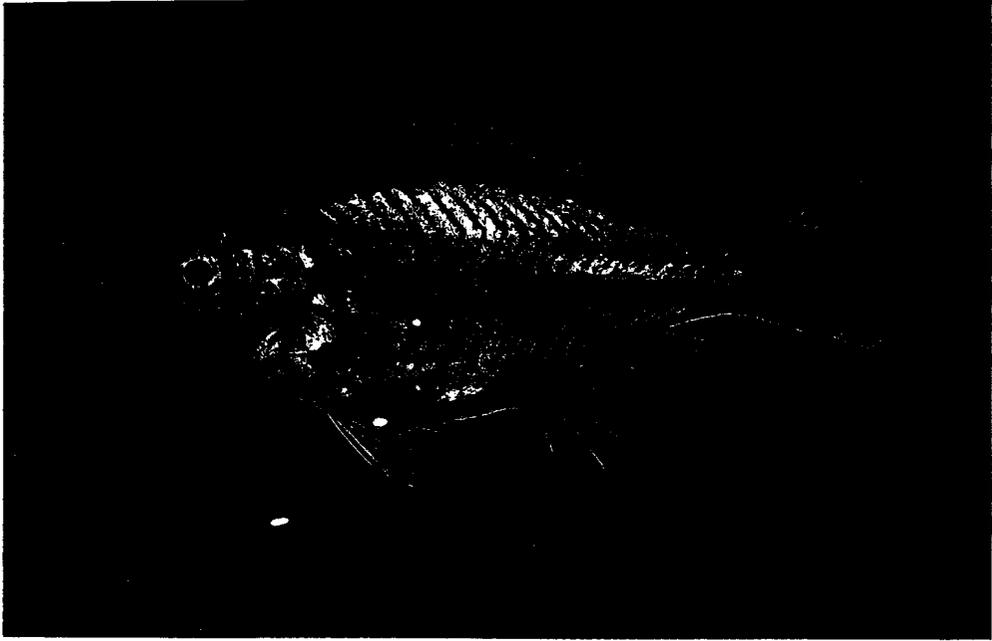


Figure 3. *Parambassis apogonoides*, 85.1 mm, Stung Treng.

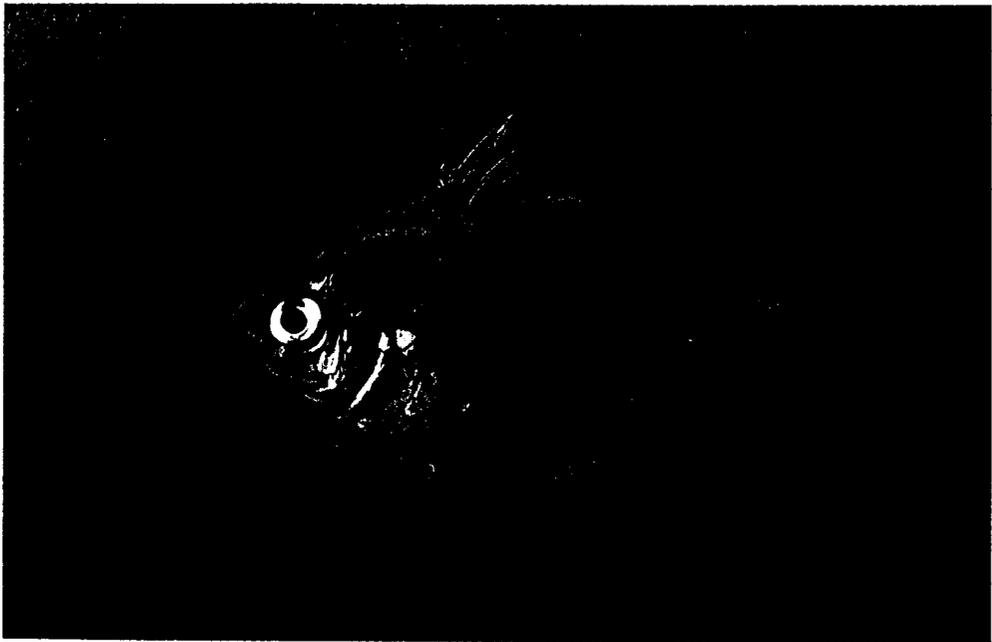


Figure 4. *Parambassis lala*, 26 mm, Mandalay.

***Paradoxodacna* Roberts, 1989**

Paradoxodacna Roberts, 1989: 160 (type species *P. piratica* Roberts, 1989, by original designation and monotypy).

Diagnosis (modified from ROBERTS, 1989: 159-60). — A scale-eating ambassid with retrognathous jaws (lower jaw shorter than upper); dentition highly specialized, different from that of all other ambassids except the markedly prognathous genus *Chanda*, which it superficially resembles (ROBERTS, 1989, fig. 125). Posterior nostril round, about same size as anterior nostril; gill rakers elongate, 5-7+15-16 = 20-23; cheek, gill cover, and body including predorsum covered with scales; scales in lateral series 62-65; transverse scale rows 8-9/1: 20-22; dorsal fin soft rays 9-10, anal 9; pectoral fin rays 14-15; no humeral mark; vertebrae 10+14=24. One species known.

***Paradoxodacna piratica* Roberts, 1989**

Figure 2

Paradoxodacna piratica Roberts, 1989:160, figs. 125-6 (type locality Kapuas basin, Kalimantan Barat (western Borneo)).

Diagnosis. — Same as for genus.

Type material examined. — ZMA 112.376, 54.9 mm, Mendalan rivier, 28 June 1908, H.A. Lorentz (paratype).

Non-type material examined. — MNHN 1992;1056, 24: 17.9-40.1 mm, Danau Sembuluh, Sungai Seruyan basin, Kalimantan Tengah, 12-13 June 1992, T. R. Roberts; ZMA 120.828, 12: 52.5-75.5 mm, Djambi, Batang Hari, 23 April 1909, P. E. Moolenburgh; BMNH 1959.4.23.19-20, 2: 56.9-68.7 mm, Djambi, Sumatra, Mooloenburgh.

Distribution. — Previously known only from Kapuas basin in western Borneo, *P. piratica* now is reported also from Seruyan basin of southern Borneo (Kalimantan Tengah) and from Sumatra.

***Parambassis* Bleeker, 1874**

Parambassis Bleeker 1874: 86 (type species *Ambassis apogonoides* Bleeker, 1851, by original designation).

Pseudambassis Bleeker, 1874: 86 (type species *Chanda lala* Hamilton, 1822, by original designation and monotypy).

Acanthoperca Castelnau, 1878: 44 (type species *A. gulliveri* Castelnau, 1878, by monotypy).

Whitleyina Fowler & Bean, 1930: vii, 163, 334 (type species *Ambassis wolffi* Bleeker 1850, by monotypy).

Diagnosis. — *Parambassis* comprises a diverse and possibly polyphyletic array of strictly

freshwater ambassids widely distributed in the Indian subcontinent, mainland and insular Southeast Asia, and the Australian region including New Guinea. They differ from all marine ambassids in having straight or only slightly upturned rather than strongly upturned jaws. Most also have much smaller scales. Scales in lateral series from 30 to about 100. Dorsal fin rays 9-16, anal 9-17. Vertebrae 10+14 = 24 or 10+15 = 25. Preorbital bone with serrations on ridge and edge.

Despite, or indeed because of, diversity of body shape and meristic characters in *Parambassis*, it is difficult to split this genus into meaningful smaller genera. The type species of the three nominal genera here placed as junior synonyms of *Parambassis* Bleeker are all quite distinct from *P. apogonoides* (type species of *Parambassis*), and may well represent good genera. But were these genera to be recognized at the present time it would be difficult or impossible to assign the rest of the known species to them with any confidence in the results. *Parambassis* can be divided into species with short dorsal and anal fins (with only 9-11 soft rays, usually without humeral spot) and long dorsal and anal fins (12-17 soft rays, usually with humeral spot) but these probably are not monophyletic groups.

Parambassis apogonoides (Bleeker, 1851)

Figure 3

Ambassis apogonoides Bleeker, 1851b:200 (type locality Banjermassing).

Parambassis apogonoides, Bleeker, 1874:103.

Chanda apogonoides, Fraser-Brunner, 1955:204.

Type material examined. — None.

Non-type material examined. — LAOS: ZRCS 35117-18, 2: 33.6-38.3 mm, Mekong R. below Lee Pee Waterfalls, June-July 1993, T. R. Roberts; CAMBODIA: CAS 81541, 85.1 mm, Stung Treng market, Jan.-Feb. 1994, T. R. Roberts; MNHN 1992.1062, 4:41.5-55.2 mm, Days km 9, Tonle Sap, 31 Jan. 1961, F. d'Aubenton; MALAY PENINSULA: ZRCS 19603, 78.5 mm, Tasek Bera, Pahang, June 1940, M. W. Tweedie; ZRCS 1313, 65.8 mm, Lake Chini, Pahang, 1967, 205th Squadron RAF Changi; BORNEO: MNHN 1982-717, 36.9 mm, Sungai Engkayas, Kapuas basin, 16 July 1976, T. R. Roberts; ZMA 112.309, 62.3 mm, Mendalan rivier, 28 June 1908, H. A. Lorentz; SUMATRA: BMNH 1959.4.23.24-25, 2:42.8-72.9 mm, Djambi, Moolenburgh; ZMA 112.297, 67.7 mm, Djambi, 1909, P.E. Moolenburgh.

Diagnosis (modified from ROBERTS, 1989: 162). — Dorsal profile moderately sloping, gently concave; preorbital ridge smooth; orbital rim with 2-3 small serrae posteriorly, otherwise smooth; upper limb of preopercular margin serrate; gill rakers 21-22; scales in lateral series 40-47; cheek with 5 scale rows; predorsum entirely covered with scales; dorsal and anal fin branched rays 10-11; second anal fin spine only slightly larger than third; pectoral fin rays 12-16; no humeral mark; vertebrae 10+14 = 24.

Serration of 36.9 mm specimen from Kapuas. — Preorbital edge with 10 serrae, ridge non-serrate; suborbital and supraorbital without serrae; preopercular ridge with 4 large serrae on horizontal limb, no serrae on vertical limb; preopercular edge with 10 spines on horizontal limb, 1 large and 19 small serrae on vertical limb.

Specimens from lower Mekong (MNHN 1992.1062) and Kapuas (MNHN 1982.717) have been compared directly and they have very similar serration.

Oral brooding. — Oral brooding of just over 100 young of 3-7 mm by a 51.6 mm *P. apogonoides* is reported by ROBERTS, 1989:162. There is no additional report of oral brooding in this species or in any other member of the family Ambassidae.

Distribution. — Previously known only Sumatra and Borneo, *P. apogonoides* is now recorded from the Malay peninsula (Pahang basin) and from the Lower Mekong basin (southern Laos below Lee Pee Waterfalls; Stung Treng, Cambodia; and Tonle Sap, Cambodia).

Parambassis baculis (Hamilton, 1822)

Chanda baculis Hamilton, 1822: 112, 371 (type locality "north-eastern parts of Bengal").
Ambassis baculis, Cuvier in Cuvier & Valenciennes, 1828: 187; Day, 1875: 51, pl. 15, fig. 1).

Parambassis baculis, Kottelat, 1989:17.

Pseudambassis baculis, Talwar & Jhingran, 1992: 803.

Type material examined. — None.

Non-type material examined. — CAS 24250, 9:21.8-30.8 mm, Indus R. near Sukkur, 4 Jan. 1969, E. S. Herald; MCZ 9711, 23.8 mm, and MCZ 9712, 3:16.8-20.5 mm, Sursutiu R., N India, M. M. Carlton; MCZ 9715, 24.6 mm, Ghugger R., M. M. Carlton; MNHN 9359, 35.0 mm, Indoustan, F. Day; BMNH 1889.2.1.2858, 34.8 mm, Gowhatty, F. Day; CAS-SU 39980, 30.6 mm, Kampong Duars & Siliguri Terai, Tista R. drainage, Nov. 1938, S. L. Hora; CAS 50345, 37.0 mm, Naraini R. 10 mi W of Narangar, 26 April 1975, T.R. Roberts; CAS 50274, 3:26.2-27.6 mm, Naraini R. 4 mi E of Khorla Mohan (below confluence with Rapti R.), 24 April 1975, T.R. Roberts; CAS 50188, 2: 30.6-35.3 mm, Rapti R. and tributaries 11 mi SSE of Narangar, April 1975, T. R. Roberts.

Diagnosis. — *Parambassis baculis* evidently is a small species (largest specimen examined under 40 mm); body moderately elongate, a characteristic shared among Asian freshwater Ambassidae only with the specialized scale-eaters *Chanda nama* and *Paradoxodacna piratica*; head shape different from all other freshwater Ambassidae; snout gently rounded, jaws short and equal, and nape distinctly concave; gill rakers on first gill arch short and stout, only 2-4+9-13 = 12-15; scales very small, lateral series about 80-100; dorsal and anal fins with 13-14 branched rays, pectoral fin rays 13; vertebrae 10+14=24.

Serration of 35.0 mm specimen from Indoustan. — Preorbital edge with 3 small upper

and 3 large lower serrae, ridge with large exposed primary serra plus 4 large lower spines; no suborbital serrae; supraorbital with a short portion without serrae anteriorly, followed by 6 small serrae beginning over middle of eye, then 3 large serrae posteriorly; ridge of preopercle non-serrate; horizontal limb of preopercle with 13 large serrae, last just above angle; vertical limb without serrae; an isolated serra above preopercle (posterior to last large supraorbital serra; no serrae on exposed portion of shoulder girdle.

Comment. — Hamilton's drawing of *C. baculis* has been published in HORA, 1929, pl. 20, fig. 7. This is not so good as his other drawings of Ambassidae, and less helpful in identifying the species. The figure of *C. baculis* in DAY, 1875 is good, and leaves no doubt as to which species he thought Hamilton had described. A lectotype should be designated, but I prefer to wait until more material becomes available and the species can be studied more carefully.

Distribution. — *Parambassis baculis* is known only from the Indus and Ganges basins.

***Parambassis dayi* (Bleeker, 1874)**

Ambassis nalua, Buch. Ham.?, Day, 1865a:12 (Cochin).

Ambassis nalua, Day, 1865b:15 (partim).

Ambassis dayi Bleeker, 1874:95 (type locality Cochin; based on Day's description of "*Ambassis nalua*, Buch. Ham.?"); Day, 1875: 54, pl. 15, fig. 7; Fraser-Brunner, 1955:198.

Ambassis valenciennii Vaillant, 1875: 34 (type locality "eaux douces de Alipay").

Parambassis dayi, Talwar & Jhingran, 1992: 801.

Type material examined. — MNHN 9351, 3:107-125 mm, Alipay [port on Malabar coast of India, south of Cochin; also spelled Alepay, Alepi, Alleppi], 1835, J. J. Dussumier (syntypes *A. valenciennesi*).

Diagnosis. — Mouth elongate and horizontal, moreso than in any other member of the family Ambassidae with possible exception of *P. thomasi*; gill rakers on first gill arch 27-28; scales large, very deciduous, predorsum entirely covered with scales; lateral scale series 34-39, transverse series 5/1/14; anal fin scale sheath with only a single row of scales; dorsal and anal fin soft rays 10-12; no humeral spot; vertebrae 10+14 = 24 (types of *A. valenciennesi*).

Serration of 107 mm specimen from Alipay. — Preorbital edge with 18 serrae of about equal size; ridge with 8 small, poorly developed serrae; suborbital ridge with about 10 small weak serrae; preopercular edge with 10 strong serrae on horizontal limb, 4 strong spines on vertical limb just above angle, then rest of edge smooth; preopercular ridge with 18 equally large serrae on ventral limb, 4 on vertical limb just above angle, and rest of vertical limb with 37 very fine, evenly spaced serrae; interopercle with 9 serrae; supraorbital entire except for 2 strong serrae at posteriormost point; exposed shoulder girdle without

serrae; strong posteriorly directed serra on skull bone just above articulation of preopercle.

Color of fresh specimens. — “Back greyish green with minute brown points, abdomen silvery, with a silver longitudinal band, and having pinkish reflections; opercles silvery, fins greyish, first and second spine of first dorsal with a blackish outer margin; fine grey points on fin membrane more especially between second and third spines. Caudal minutely spotted. Eye silvery” (DAY, 1865b: 16).

Comments. — Fraser-Brunner did not examine material of *A. dayi*, and did not mention *A. valenciennii* (for which the correct spelling is *A. valenciennesi*). *Parambassis dayi* is morphologically most similar to *P. thomasi*, but they are certainly different species. *Parambassis dayi* has a more elongate body, and slightly more gill rakers.

Distribution. — *Parambassis dayi* occurs in several SW Indian coastal rivers.

***Parambassis lala* (Hamilton, 1822) new comb.**

Figure 4

Chanda lala Hamilton, 1822: 114, 371, pl. 16, fig. 39 (type locality fresh waters of Gangetic provinces; description based only on males).

Ambassis alta (partim) Cuvier in Cuvier & Valenciennes, 1828: 183 (type locality Bengale).

Ambassis lala, Cuvier in Cuvier & Valenciennes, 1828: 184 (after Hamilton, 1822).

Pseudambassis lala, Bleeker, 1874: 86; Talwar and Jhingran, 1992: 804.

Type material examined. — MNHN 9341, 3: 23.7-28.9 mm, Bengale, Duvaucel (syntypes *A. alta*).

Non-type material examined. — MCZ 60878, 25.3 mm, Sind Tatta, SE Karachi, 19 July 1955, Peabody Mus. Exped.; MCZ 9714, 3: 17.2-20.0 mm, Sutlej R. at Loodiana, M. M. Carlton; MNHN 9342, 5:16.4-21.8 mm, Calcutta, Dussumier; MNHN uncat. (ex MNHN 9356), 4:21.0-25.6 mm, Bengale, Day; BMNH 1934.10.17.97-99, 3: 19.0-22.9 mm, Amadpur, Bengal, Das; CAS-SU 33338, 16:13.9-38.2 mm, Pulta, Ganges delta, 10 April 1937, A. W. Herre; CAS-SU 33335, 2: 19.4-26.3 mm, Uttarbagg, Ganges delta, 14 April 1937, A. W. Herre; CAS 50374, 8: 20.6-26.0 mm, Khailaya market, Terai, Nepal, 1 May 1975, T. R. Roberts; CAS 79072, 132: 11.0-28.2 mm, riverside pools and fish ponds near Sonapur, Mahanadi basin, Orissa state, 20-21 Feb. 1985, T. R. Roberts; CAS 81542, 96: 13.6-28.0 mm, Mandalay market, 13-25 April 1993, T. R. Roberts; CAS 81543, 3: 20.0-25.5 mm, swampy stream in rice paddy on western outskirt of Mandalay, 20 April 1993, T.R. Roberts.

Diagnosis. — *Parambassis lala* is distinguished from all other Asian freshwater ambassids by having males with very distinctive coloration of body and fins and from all others except *Gymnochanda* by very small adult size. Sexually active males with a single large ctenus projecting from each scale on body above anal fin base and on scaly sheath of anal fin.

Gill rakers on first gill arch 16-18; scales in lateral series 66; dorsal fin branched rays 13-15, anal 14-17; pectoral fin rays only 10-12; scales in lateral series 66; supraoccipital portion of predorsum without scales; humeral spot present; vertebrae $10+14 = 24$ ($10+15 = 25$ in most other Indian freshwater Ambassidae).

Anal fin scale sheath with up to 5 rows of scales. In males scales of anal fin sheath and adjacent part of body each with a single posteriorly projecting ctenus or contact organ (sensu WILEY & COLLETTE, 1970; COLLETTE, 1977); contact organs otherwise unknown in Ambassidae.

Preorbital edge with 7 moderately large serrae, ridge with 3 small downwardly directed serrae (no primary or major spine on dorsal part of ridge); supraorbital with anterior half smooth, posterior half with 6 small spines; suborbital without serrae; preopercular ridge horizontal limb with 9 moderately large serrae, 1 serra just above angle, otherwise vertical limb non-serrate; preopercular edge with 12 nearly equal small serrae on horizontal portion, vertical portion with 2 small serrae just above angle and 7 very small serrae on upper half; no serrae on interopercle or shoulder girdle.

Coloration. — Live fish translucent greenish, yellow, or even orangish. Adult males with two broad, vertical dark bands, composed of numerous fine and close-set melanophores, clearly visible even in discolored specimens 150 years old; distal portion of first and second dorsal fins and entire pelvic fins black.

Discussion. — Although clearly distinguished and well figured by HAMILTON, 1822, this very distinctive but tiny species was placed as a synonym of *A. ranga* by DAY, 1875: 51 and left there by FRASER-BRUNNER, 1955. And whereas Cuvier (in CUVIER & VALENCIENNES, 1828) recognized *Chanda lala* as valid on the basis of the original description by Hamilton, he failed to recognize the species in his own material. Cuvier utilized two samples collected by Duvaucel in Bengale for the description of *Ambassis alta*. One sample, MNHN 9342, comprises a 23.7-mm sexually mature male and two gravid females, 28.8-28.9 mm, of *Parambassis lala*. The three specimens have only 10-12 pectoral fin rays, anal fin sheath with up to 5 scale rows, and $10+14 = 24$ vertebrae. The other sample used by Cuvier to describe *A. alta*, MNHN 9340, 3:35.4-48.3 mm, is of *Parambassis ranga*.

Until the freshwater ambassids of Asia have been studied more thoroughly, I prefer a conservative approach to their generic classification. Thus *Pseudoambassis* is not recognized as a valid genus here, even though its type species, *P. lala*, is distinctive and may merit generic separation from the other species here assigned to *Parambassis*.

Distribution. — *Parambassis lala* is known from lowlands of the Ganges-Brahmaputra and Mahanadi basins in India and the Irrawaddy basin in Myanmar.

***Parambassis macrolepis* Bleeker, 1857**

Figure 5

Bogoda macrolepis Bleeker, 1857: 13 (type locality Pontianak, Kapuas R.).

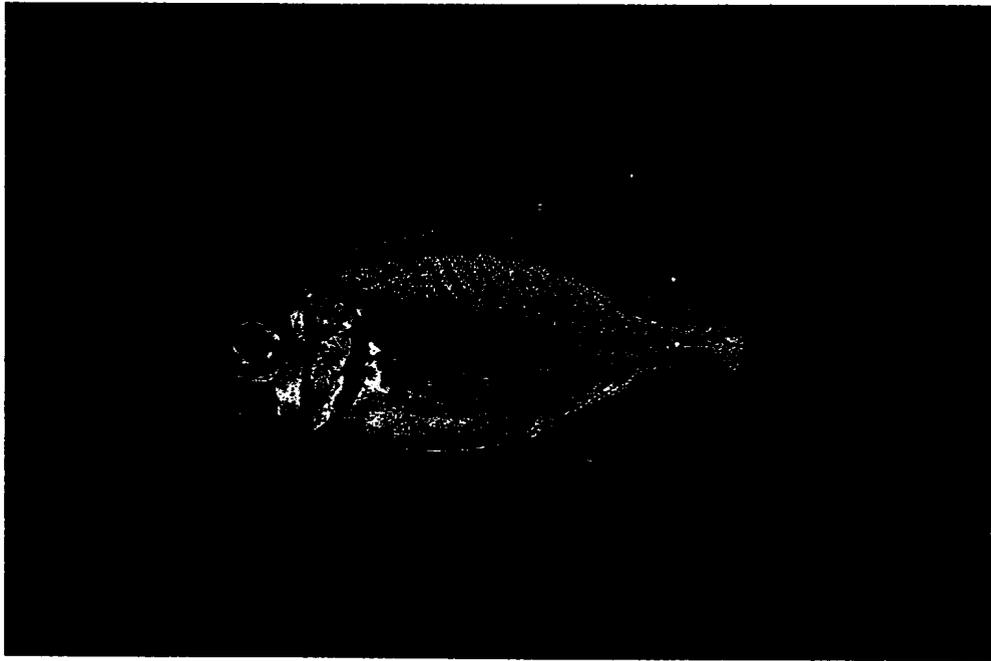


Figure 5. *Parambassis macrolepis*, 72 mm, Danau Sembuloh.

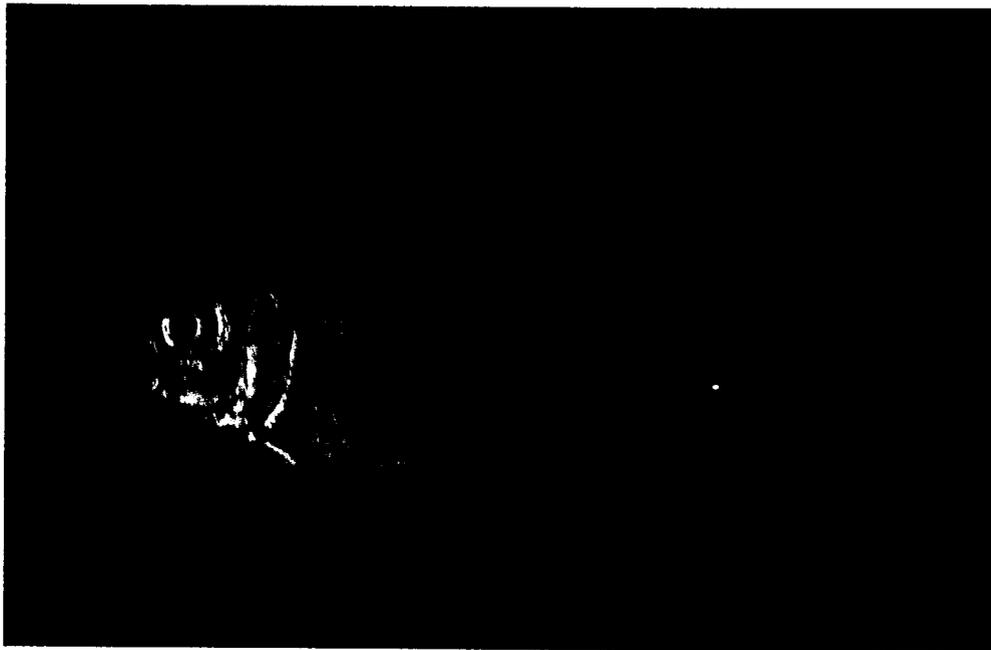


Figure 6. *Parambassis ranga*, 64.5 mm, Lake Inle.



Figure 7. *Parambassis siamensis*, Tonle Sap.



Figure 8. *Parambassis tenasserimensis*, 65.7 mm, Tapoleh Kloh (holotype).

Ambassis (Bogoda) microlepis von Martens, 1868: 9 (Kapuas; unwarranted spelling emendation).

Parambassis microlepis, Bleeker, 1874: 104.

Ambassis microlepis, Vaillant, 1893: 110 (Kapuas).

Chanda macrolepis, Fraser-Brunner, 1955: 205.

Parambassis macrolepis, Roberts, 1989: 162, fig. 128 (Kapuas).

Type material examined. — None.

Non-type material examined. — ZMA 112.377, 3: 66.5-72.3 mm, Boenoet, Borneo, 26 June 1909, H. A. Lorentz; MNHN 1992.1057, 5: 60.8-78.0 mm, Danau Sembuluh, Sungai Seruyan basin, Kalimantan Tengah, 12-13 June 1992, T.R. Roberts; BMNH 1959.4.23.18, 74.2 mm, Djambi, Sumatra, Moolenburgh.

Diagnosis (modified from ROBERTS, 1989: 162). — Body moderately deep; dorsal profile strongly concave, moreso than in any other *Parambassis*; preorbital ridge without serrae; gill rakers on first gill arch 6-7+11-12 = 17-18; scales in lateral series 50-59; cheek with 13-15 scale rows; predorsum entirely covered with scales; predorsal scales more than 30; transverse scales rows 9/1/30; anal fin scale sheath with up to 3 or 4 scale rows; dorsal and anal fin soft rays 9-11; pectoral fin rays 13-15; no humeral spot; vertebrae 10+14=24(5) (Sembuluh).

Serration (sample from Sembuluh). — Preorbital edge with 10 well developed serrae, ridge without any serrae; suborbital non-serrate; supraorbital non-serrate except for small terminal serra; preopercular edge horizontal limb 12 serrae and 2 near angle, vertical limb otherwise non-serrate; preopercular ridge horizontal and vertical limb non-serrate except for 2 large serrae near angle; interopercle 7 weak serrae; shoulder girdle non-serrate.

Food habits. — Stomach contents of 72-mm specimen from Danau Sembuluh consist of three *Rasbora*-like cyprinid fishes 15-20 mm standard length.

Distribution. — *Parambassis macrolepis* is known only from Sumatra (Batang Hari) and Borneo (Kapuas in Kalimantan Barat; Seruyan in Kalimantan Tengah).

Parambassis ranga (Hamilton, 1822)

Figure 6

Chanda ranga Hamilton, 1822: 113, 371, pl. 16, fig. 38 (type locality "fresh waters of all parts of the Gangetic provinces").

Ambassis ranga, Cuvier in Cuv. & Val., 1828: 183; Day, 1878: 51, pl.

Ambassis barlovi Sykes, 1841: 350, pl. 60 fig. 1 (type locality Beema River at Pairgaon).

?*Ambassis indica* McClelland, 1842: 585, pl. 4 fig. 1 (type locality Loodianah).

Ambassis notatus Blyth, 1860: 138 (type locality Sittang River at Pegu).

Pseudambassis notatus, Guha & Talwar, 1983: 15, fig. 1 (Blyth type specimens redescribed).

Pseudambassis ranga, Talwar & Jhingran, 1992:805.

Parambassis ranga, Kottelat, 1989:17.

Type material examined. — MNHN 9340, 3: 35.4–48.3 mm, Bengale, Duvaucel (syntypes *A. alta*); BMNH uncat., 2:34.7–41.2 mm, Dukhun, Sykes (with printed label “*Equula Bilineata* Dukhun Sykes” [unpublished name]; probable syntypes *A. barlovi*).

Non-type material examined. — PAKISTAN: ZMA 115.934, 2: 43.2–47.2 mm, Indus R., Kasur dist., 1 March 1977, M. Saddiq; INDIA: MCZ 9710, 11: 30.5–35.6 mm, Ghugger R., M.M. Carlton; BMNH 1889.2.1.2844–45, 2: 46.9–57.5 mm, Assam, F. Day; MNHN 9356, 50.7 mm, Bengale, Day; CAS 50308, 4: 37.7–50.1 mm, Rapti R. at Darbar, 25 April 1975, T.R. Roberts; CAS 50352, 4: 43.1–55.6 mm, Naraini R. 10 mi W of Narangar, 26 April 1975, T.R. Roberts; CAS-SU 39991, 43.0 mm, Kalimpong Duars & Siliguri Terai, Tista R. drainage, Nov. 1938, A. W. Herre; CAS 79077, 37.4 mm, riverside pools and fish ponds near Sonapur, Mahanadi basin, Orissa state, 20–21 Feb. 1985, T. R. Roberts; BMNH 1938.2.22.132–141, 33: 28.7–48.6 mm, Darna R., Deolali, Nasik dist., Bombay prov., Bombay Natural History Society; CAS 61947, 3: 23.6–37.0 mm, Tungabhadra R. at Kampli, 2 Feb. 1985, T.R. Roberts; CAS 79076, 127: 17.2–63.7 mm, Tungabhadra R. at Hampi, Krishna basin, Karnataka state, 3 Feb. 1985, T.R. Roberts; CAS-SU 39992, 32.3 mm, Kalavacherla, Vizagapatam dist., Madras pres., 6 Sept 1939, Fisheries Research station at Vizagapatam; CAS-SU 39990, 35.9 mm, Madras, 3 Jan. 1941, A. W. Herre; MNHN 9350, 54.9 mm, Coromandel, Belanger; CAS-SU 33341, 7: 30.9–45.1 mm, Cuddapah, S. India, April, 1937, A. W. Herre; MYANMAR: AMNH 13795, Kaung Hein, Vernay-Hopwood Chindwin Exp.; ZMA 112.408, 53.7 mm, Irrawaddy at Bhamo; CAS uncat., 11:24.2–67.6 mm, Irrawaddy R. at Indaw, Chaung and Kamaing, 27 March 1956, J.A. Tubb; MNHN 9343, 4: 38.3–44.1 mm, Irawadi, 1829, Reynaud; CAS 53385, 45.6 mm, Saung-hka Chaung near Kamaing, Burma, 27 March 1956, J. A. Tubb; CAS 53383, 36.9 mm, Mogaung Chaung at Mogaung, Burma, 28 March 1956, J. A. Tubb; CAS uncat., Lake Indawgyi, upper Burma, 24 March 1956, J. A. Tubb; CAS 81660, 2: 54.8–64.5 mm, Inle Lake, 5 March 1994, T. R. Roberts; ZMA 112.312, 2: 46.8–55.0 mm, Mandalay market, Annandale; MNHN 9344, 2:46.7–48.2 mm, Rangoon, 1829, Reynaud; CAS-SU 40233, 3: 25.0–44.0 mm, Rangoon, 1940, G. E. Gates; CAS-SU 33333, 3: 52.3–66.5 mm, and CAS-SU 33339, 8:45.6–63.2 mm, Rangoon, 30–31 March 1937, A.W. Herre; CAS 79078, 11: 34.7–57.0, and CAS 79148, 12: 43.7–62.9 mm, Rangoon market, 5–12 March 1985, T. Roberts; BMNH 1891.11.30.9–18, 27:37.6–61.7 mm Sittang R., E.W. Oates; CAS 79147, 5: 21.6–55.0 mm, Kha-Yein Chaung, at Wah Kit Khone village, about 4 km NE of Hlegu on road to Pegu, Sittang basin, 9 March 1985, T. R. Roberts; THAILAND: CAS 79079–80, 5: 22.2–58.3 mm, Salween R. mainstream near Mae Sam Leap, Thailand, 21 April 1989, T. R. Roberts; CAS 79081,3: 40.3–44.6 mm, Menam Moei 129 km N of Mae Sot on highway 1085, Salween basin, 27 April 1991, T. R. Roberts; BMNH 1893.2.16.1–3, 3: 50.7–71.5 mm, Kokarit, Salween basin, L. Fea; BMNH 1889.2.1.2859–60, 2: 44.3–53.0 mm, Moulmein, F. Day.

Diagnosis. — A moderately deep bodied species; gill rakers 6–8+15–20 = 22–28; scales in lateral series about 56–70; transverse scale rows 9–11/1/30–33; anal fin sheath with up to

3 scale rows; dorsal fin soft rays 14-16, anal 14-17; pectoral fin rays 12-13; humeral mark present; vertebrae 10+15 = 25.

Morphometrics. — Morphometrics of two specimens of *P. ranga* from Inle Lake are given in Table 1. This sample was chosen for measurement because it appeared to be morphometrically typical of many samples of *P. ranga*.

Serration. — 49.1-mm specimen from Bengale: Preorbital ridge with 7 moderately large serrae, edge with very large exposed primary or major serra and 7 smaller serrae; suborbital with 9 very small serrae; supraorbital with 11 serrae, largest posteriorly; preopercular ridge with 8 serrae on horizontal limb and 1 just above angle, vertical limb otherwise smooth; preopercular edge with 12 serrae on horizontal limb and 15-16 small serrae on vertical limb; exposed part of shoulder girdle with 4 small upper and 2 or 3 very small lower serrae.

Serration of 54.9-mm specimen from Coromandel: Preorbital edge 8 serrae (lower 3 very small), ridge large primary and 4 moderate serrae; suborbital non-serrate; supraorbital smooth anteriorly, 4 moderate serrae posteriorly; preopercular edge entirely smooth except for 2 moderately large serrae near angle; preopercular ridge with 13 equal sized serrae on horizontal limb and 25 tiny serrae on vertical limb; interopercle no serrae; pectoral girdle with 6 weak upper and 7 very small lower serrae.

Serration of 52.9-mm specimen from Rangoon: Preorbital edge 8 large serrae, ridge large primary plus 3 moderately large serrae; preopercular edge horizontal limb 13 and vertical limb 19 serrae, preopercular ridge horizontal limb 4 serrae plus 1 at angle, vertical limb no serrae; interopercle no serrae; shoulder girdle feebly serrate, 2 upper and 1 lower small serrae.

Coloration. — HAMILTON, 1822:113-14 described color of live Gangetic *P. ranga* as follows: "...bright green and silver gloss. The whole, except the gill covers, which are silvered, is diaphanous, showing the muscles, five ribs on each side the backbone, a silvery stripe accompanying the latter, and a silvery membrane that lines the cavity of the abdomen. The upper parts are dotted with black... the scales on the body and fins are minute, and so transparent, that they can scarcely be seen without a magnifying glass: they are marked with concentric lines." Specimens from the clear Lake Inle are particularly colorful (Fig. 6). Samples from muddy water are much less colorful.

Distribution. — *Parambassis ranga* is widely distributed in Pakistan, India, and Myanmar, including but not limited to the Indus, Ganges-Brahmaputra, Mahanadi, Gadavery, Krishna, Cauvery, Irrawaddy, Sittang, and Salween river basins.

Parambassis siamensis (Fowler, 1937) new comb.

Figure 7

Chanda siamensis Fowler, 1937: 230, fig. 228 (type locality Bangkok).

Chanda punctulata Fraser-Brunner, 1954: 206, fig. 3 (type locality Tasek Bera, Pahang).

Parambassis punctulatus Kottelat, 1989: 17.

Type material examined. — ANSP 68233, 45.2 mm, Bangkok, 1936, R.M. deSchaunsee (holotype *C. siamensis*); ANSP 68234-41, 8:26.8-36.9 mm, Bangkok, 1936, R. M. deSchaunsee (paratypes *C. siamensis*); BMNH 1931.7.20.56-65, 15:11.8-34.7 mm, Tasek Bera, Pahang, Dept. Fisheries Singapore (presumably 34.7-mm specimen is holotype and other 14 are paratypes of *C. punctulata*).

Non-type material examined. — MEKONG BASIN: CAS 79087, 25:21.7-42.9 mm, Huay Nam Ngam and Mekong mainstream 1 km downriver from That Phanom, 1 Jan. 1989, T. R. Roberts; CAS 79149, 14: 10.6-37.6 mm, Si-Saket market, NE Thailand, 29 March 1990, T. R. Roberts; CAS 79090, 18: 27.1-50.3 mm, Ubol Ratchatani market, 15 Dec. 1992, T. R. Roberts; CAS 79150, 16:24.1-40.5 mm, Menam Dom on highway 2248, 17 km E of Nam Yun, about 100 km S of Ubol Ratchatani, 21 Dec. 1990, T. R. Roberts; CAS 79085, 5: 17.1-40.1 mm, dammed backwater of Menam Chi at Agricultural College, Maha Chana Chai, 14 March 1991, T. R. Roberts; CAS 79084, 64: 23.1-38.3 mm, northern end of Sirinthorn Reservoir, near Phibun Mansahan, 14 Sept. 1990, T. R. Roberts; MNHN 1927.181-2, 20: 29.5-39.4 mm, Prek Phnan, Cambodia, 27 Dec. 1923, A. Krempf; CHANTABURI BASIN: CAS 79098, 49.6 mm, large river on highway 3245, 19 km from junction with highway 3, 11 Dec. 1990, T. R. Roberts; CHAO PHRAYA BASIN: CAS 79151, 3: 25.8-31.6 mm, irrigation canal about 6 km E of Pichit, Chao Phraya basin, 30 Nov. 1990, T. R. Roberts; CAS 79089, 6: 32.0-43.4 mm, Nakorn Sawan market, 4-5 Feb. 1989, T. R. Roberts; BANGPAKONG BASIN: CAS 79088, 3: 32.0-33.7 mm, Klong Waeh Kamong at highway 304, 9 km by road N of junction with highway 33 at Kabinburi, 22 March 1989, T. R. Roberts; CAS 79152, 32: 20.5-31.2 mm, open channel in large swamp about 9 km SSW of Prachinburi, 1-2 Dec. 1990, T. R. Roberts; MEKLONG BASIN: CAS 79092, Huai Kha Khaeng at Khao Bandai (near confluence with Huay Mae Di); CAS 79091, 190: 13.0-33.6 mm, Huay Kha Khaeng arm of Srinakarin Reservoir at Greung Grai, Meklong basin, 22 Jan. 1991, T. R. Roberts; CAS 79153, 4: 17.4-25.1 mm, Sangklaburi market, Meklong basin, 12 Feb. 1989, T. R. Roberts; CAS 79093, 3: 29.6-37.5 mm, Huai Malai, 21 km WNW of Sangklaburi, 12 Feb. 1989, T. R. Roberts; CAS 79094, Huay Chee, about 25 km SW of Kanchanaburi, 23 Feb. 1990, T. R. Roberts; TAPI BASIN: CAS 79095, 23: 20.6-31.1 mm, Klong Ipan, on highway 4037 2 km S of junction with highway 4035, 4 March 1989, T. R. Roberts; CAS 79154, 12: 26.6-34.8 mm, CAS 79096, 13: 25.9-35.5 mm, Klong Sok 5 km W of Phanom on highway 410, 27 Feb. 1989, T. R. Roberts; PATTANI BASIN: CAS 79155, 45: 25.2-36.4 mm, CAS 79097, 36: 24.2-31.1 mm, Pattani R. mainstream and tributary 35 km by road N of Betong on highway 410, 11 March 1989, T. R. Roberts; PAHANG BASIN: CAS-SU 30405, 2: 33.2-34.7 mm, Tasek Bera, 15 March 1934, A. W. Herre; ZRCS 9466-67, 2:29.1-36.2 mm, Lake Chini, no date, 205 Sqn Changi; CAS 79062, 2: 37.7-40.5 mm, Tasek Chini, no date, Royal Air Force Changi; ZRCS 2522, 7: 25.0-28.7 mm, Kuala Tahan, 1948, C.S. Ogilvie; ZRCS 12793, 23.5 mm, Kuala Lipis, 21 Jan. 1958, Speakman; JOHORE: ZRCS 12794, 38.3 mm, Sembrong West Dam, 14 April 1990, V. Yong and K. Yong; ZRCS 12790-91, 2: 37.5-39.1 mm, near Layang-Layang, 14 March 1990, P.K.L. Ng.

Diagnosis. — *Parambassis siamensis* is very similar to *P. ranga* but generally attains a smaller size and tends to have fewer scales. Gill rakers on first gill arch 5-7+17-18 = 22-25; predorsum fully scaled; scales in lateral series about 55-60, transverse 11/1/22-23; cheek with 5 scale rows; scale sheath on anal fin with 2 scale rows; humeral mark very weakly developed or absent; vertebrae 10+14-15 = 24 (1), 25 (19).

Comments. — Fraser-Brunner distinguished his *C. punctulata* from all other species of Asian freshwater ambassids mainly by color, i.e., the punctulate marginal coloration of almost every scale on the body (FRASER-BRUNNER, 1954, fig. 3). Identical punctulation occurs in some samples of *P. ranga* and in *P. siamensis*, especially in those collected from reservoirs. In the material examined of *P. siamensis*, specimens from Srinakarin and Sirinthorn reservoirs show this coloration particularly well. It is noteworthy that Fraser-Brunner reported a paratype of *C. punctulata* from Lahore; I have not examined this specimen, but presumably it is of *P. ranga*. Thus no useful character was provided by Fraser-Brunner, nor is any known, to distinguish between *P. punctulata* and *P. siamensis*.

At most localities *P. siamensis* matures at a relatively small size, under 30 mm, and does not grow much larger. In a few localities it attains a somewhat larger size, to 40 or 50 mm, but nowhere does it attain the sizes commonly attained by *P. ranga*, i.e. 60 or even 70 mm.

Distribution. — *Parambassis siamensis* occurs in the Middle and Lower Mekong basins of Thailand, Laos, Cambodia, and Vietnam; and in lowland rivers throughout Thailand and the Malay peninsula (Mekong, Chantaburi, Bangpakong, Chao Phraya, Meklong, Tapi, Pattani, Pahang, Perak, and lesser basins).

Parambassis tenasserimensis new species

Figure 8

Holotype. — CAS 79082, 65.7 mm, Tapoleh Kloh, Tenasserim basin, 13 March 1992, T.R. Roberts.

Paratypes. — BMNH 1992.11.16.14-15, 2: 46.9-47.7 mm, Tenasserim R., March 1992, T.R. Roberts; CAS 79083, 4:49.1-52.7 mm, Kayethoo Kloh, Tenasserim basin, 12 March 1992, T.R. Roberts; CAS 81657, 49.8 mm, Tenasserim R., March 1992, T.R. Roberts.

Diagnosis. — *Parambassis tenasserimensis* is the most deep-bodied species of *Parambassis*, with steep predorsal profile and short, deep caudal peduncle. Gill rakers on first gill arch 5-8+16 = 21-24; dorsal fin soft rays 14-17, anal 14-18, pectoral 12-13; predorsum near midline scaleless; scales in lateral series 53, transverse 8/1/23; anal fin sheath with only two scale rows anteriorly and one row posteriorly; oval humeral spot present; vertebrae 10+15 = 25.

Morphometrics. — Morphometrics of *P. tenasserimensis* are compared with *P. ranga* and *P. vollmeri* in Table 1. Head length and body depth are greater than in *P. ranga*.

Depth of the caudal peduncle, 4.0-4.6 times in standard length, probably is greater than in any other species of *Parambassis*. The peduncle also probably is shorter than in other *Parambassis*, but this is not reflected in the standard measurement of peduncle length to the middle of the caudal fin base because in this species it measures mainly the increased height of the peduncle.

Serration. — 50.8-mm specimen: Preorbital edge 5 serrae, ridge major serra and 4 small serrae; suborbital non-serrate; supraorbital with 4 serrae beginning over posterior part of eye; preopercular edge lower limb with 9 discrete serrae, vertical limb about 10 weak serrae; interopercle non-serrate; shoulder girdle with 3 upper and 3 lower serrae.

Coloration of fresh specimens. — Head, body and fins dusky olive green overall; preopercle and opercle silvery, abdomen whitish. spinous dorsal, anterior parts of dorsal and anal, outer margin of pelvic, and upper lobe of caudal fin yellowish; pectoral fin clear; humeral mark black; scale margins outlined by fine melanophores.

Discussion. — This species is close to *P. ranga*, but I have not observed any *P. ranga* (including many large specimens not preserved) with a comparably deep body and caudal peduncle, similar steep predorsal profile, or coloration quite like these Tenasserim specimens.

Distribution. — *Parambassis tenasserimensis* is known only from the Tenasserim basin in southeastern Myanmar.

Table 1. Morphometric comparison of three species of *Parambassis*.

	<i>ranga</i>	<i>tenasserimensis</i>	<i>vollmeri</i>
n: standard length mm	2: 54.8-64.5	5: 47.8-65.7	3: 54.4-67.1
locality	Inle	Tenasserim	Mae Sa Nga
head	3.5-3.9	3.0-3.4	3.6
snout	9.6-10.9	8.6-11.2	12.1-13.2
eye	11.3-11.8	7.9-9.5	8.6-9.0
interorbital	12.7-13.9	11.5-13.1	11.0-11.8
body depth	2.3-2.4	1.8-2.0	1.8-2.0
caud. ped. length	6.0-6.3	7.0-8.7	7.0-7.7
caud. ped. depth	8.3-9.1	6.8-7.9	8.0-8.7
1st dor. fin base	4.8-5.4	4.3-4.7	4.2-4.4
1st dor. fin height	4.9-5.5	4.0-4.6	5.1-5.2
2nd dor. fin base	3.5	3.5-3.7	3.1-3.4
2nd dor. fin height	5.1-5.9	4.7-5.7	5.5-6.0
anal fin base	2.8	2.5-2.7	2.6-2.8
anal fin height	3.2-4.6	4.2-5.1	5.5-5.8

Parambassis thomasi (Day, 1870)

Ambassis thomassi Day, 1870: 369 (type locality Calicut and Mangalore); Day, 1875: 52, pl. 15, fig. 2)

Ambassis thomassi (nec Day, 1870), Hora, 1923 (Menam Chao Phya at Bangkok and Nontaburi, Thailand; specimens not re-examined, but identification certainly erroneous).

Chanda thomasi, Smith, 1945: 482 (corrected spelling of species name; mistakenly reported from Thailand).

Chanda thomassi, Fraser-Brunner, 1955: 204.

Parambassis thomassi, Kottelat, 1989: 17; Talwar & Jhingran, 1992: 802.

Type material examined. — BMNH 1870.5.2.2-3, 2: 57.9-82.9 mm, Wynaad, Day (probable syntypes *A. thomasi*); MNHN 9358, 61 mm, Comorin, Day (probable syntype *A. thomasi*).

Non-type material examined. — BMNH 1889.2.1.2861, 58.4 mm, Malabar, F. Day; MCZ 4310, 99.4 mm, Canara, F. Day; BMNH 1889.2.1.2862-63, 2: 55.3-68.8 mm, Canara, F. Day

Note on spelling of name. — The spelling *Ambassis thomassi* appears at the beginning of the species description (DAY, 1870: 369) and is not repeated in the text. Day gave the collector's name, H. E. Thomas (p. 369), and stated (p. 370) "I have named the species after Mr. Thomas." Following Article 32 (c) (ii) of the International Code of Zoological Nomenclature (1985 ed.) the spelling should be corrected to *Ambassis thomasi*.

Diagnosis. — Mouth relatively elongate, nearly horizontal (as in *Parambassis dayi*); lower jaw slightly projecting; gill rakers on first gill arch 8-9+16-19 = 24-28; predorsum fully scaled; cheek with 5 scale rows; scales in lateral series 39-40 (35-41 according to DAY, 1875: 52); lateral line scales 40; transverse scale rows 6/1/13; dorsal and anal fin scaly sheaths with two scale rows; predorsum entirely covered with scales; dorsal and anal soft fin rays 10-11; second anal fin spine very slightly larger than third; pectoral fin rays 15; no humeral spot; vertebrae 10+14 = 24.

Serration. — 61.0-mm specimen from Comorin: Preorbital edge with 11 evenly spaced, rather small serrae distributed on entire length, ridge entirely without serrae, no primary serra dorsally; suborbital: with about 12 very small serrae; supraorbital with 4 moderately large serrae posteriorly, otherwise entire; preopercular ridge with 7 small serrae horizontally, and one small one just above angle, vertical limb otherwise non-serrate; preopercular edge with 13 small serrae on horizontal portion and 28 small serrae on vertical portion; a serra above preopercular articulation; interopercle with 8 uniformly small serrae; shoulder girdle non-serrate.

Coloration. — "Greenish, shot with silvery; no lateral silvery band" (DAY, 1870: 370); "Greyish, spotted with silvery, there are also brownish basal marks on many of the scales,

more especially along the back" (DAY, 1875: 53).

Distribution. — Known only from fresh water on Malabar (southwest) coast of India; "the coasts of Canara as low as Cochin: it is found some distance inland even in elevated localities" (DAY, 1875: 52).

Parambassis vollmeri new species

Figure 9

Ambassis ranga Vinciguerra, 1890: 35 (partim; one specimen from Meetan, upper Houngarao [Salween basin]).

Holotype. — CAS 79220, 55.5 mm, Thailand, Salween basin, rapids in Menam Moei at km 129 N of Mae Sot on highway 1085, 26 April 1991, T.R. Roberts.

Paratypes. — CAS 79074, 70: 31.1-54.2 mm, collected with holotype CAS 79075, 139: 13.7-40.8 mm, Thailand, Salween basin, night seine on sandy beach, Menam Moei at 129 km N of Mae Sot on highway 1085, 27 April 1991, T. R. Roberts; CAS 79073, 3: 28.5-38.3 mm, and ZMA 120.862, 3: 32.9-36.2 mm, Menam Moei at Klerko, about 100 km N of Mae Sot, 16 April 1989, T.R. Roberts; CAS 81659, 14: 31.7-38.8 mm, Tiklo Melaah, small gravel-bottom stream flowing from Burma into Menam Moei opposite Klerko, about 100 km N of Mae Sot, 24 April 1989, T. R. Roberts; CAS 81658, 3: 54.4-67.1 mm, Thailand, Salween basin, Nam Mae Sa Nga at Ban Huai Khan, 24 km N of Mae Hong Son, 16 Feb. 1991, T. R. Roberts; CAS 79221, 49.1 mm, Thailand, Salween basin, Huay Khong just below mouth of Huay Long, about 45 km ENE of Mae Hong Son, 20 Feb. 1991, T.R. Roberts.

Diagnosis. — *Parambassis vollmeri* is distinguished from all other ambassids (marine and freshwater) by its brilliant, largely iridescent coloration and distinctive black marks on body and fins. Gill rakers on first gill arch only 3-4+10-12 = 13-16. Predorsum naked; lateral line scale series about 50, transverse 8/1/18; dorsal and anal fin scale sheath mostly with only a single scale row, incomplete posteriorly especially on dorsal fin (some small scales anteriorly forming a second row on both fins). Dorsal and anal fin branched rays 16-17; pectoral fin rays 12-13. Vertebrae 10+15 = 25.

Morphometrics. — Morphometrics of *P. vollmeri* are compared with those of *P. ranga* and *P. tenasserimensis*, the species of *Parambassis* with geographical ranges overlapping or nearby its range, in Table 1. The snout of *P. vollmeri*, with length 12.4-13.2 times in standard length, probably is shorter than in any other species of *Parambassis*. Head length, 3.0-3.4, is slightly greater than in *P. ranga* or *P. tenasserimensis*. The more posterior dorsal and anal fin soft rays of *P. vollmeri* appear to be shorter than in other *Parambassis*, although this is not reflected in the height of the longest elements at the beginning of the fins.

Serration. — 49.9-mm specimen from Huay Khong: Preorbital edge with 8 moderate serrae, ridge with large major serra directed posteriorly and 4-5 small serrae projecting ventrally; suborbital non-serrate; supraorbital with 9 serrae of increasing size beginning over middle of eye; preopercular edge lower limb with about 5 weak serrae plus 1 just above angle, vertical limb otherwise non-serrate; preopercular ridge with 11 serrae on horizontal and 18 on vertical limb; a strong posteriorly directed serra immediately posterior to last supraorbital serra and above origin of preopercle; interopercle without serrae; shoulder girdle with 2 small upper and 6 small lower serrae.

Distribution. — *Parambassis vollmeri* is known only from large, clearwater tributaries of the Salween basin (Nam Mae Sa Nga, Huay Khong, Menam Pai and Menam Moei in Thailand, upper Houngrao in Myanmar).

Etymology. — *Parambassis vollmeri* is named after the late Ernest Vollmer, Jr., of San Luis Obispo, California, for his interest in ichthyological exploration.

***Parambassis wolffii* (Bleeker 1851)**

Figure 10

Ambassis wolffii Bleeker, 1851a: 9 (type locality Bandjermassin).

Ambassis robustus Güocality Borneo).

Ambassis boulenger Volz, 1903: 553 (type locality Palembang, Sumatra).

?*Ambassis thomassi*, nec Day Hora, 1923

Ambassis wolffii, Weber & de Beaufort, 1929:401

Acanthoperca wolffii, Fowler, 1937: 230 (Thailand)

Chanda wolffi, Smith, 1945: 482 (Thailand)

Parambassis wolffi, Allen, 1982: 166

Type material examined. — None.

Non-type material examined. — MNHN 1989.1344, 2: 51.9-69.5 mm, Days km 9, Cambodia, 30 Jan. 1960, F. d'Aubenton; MNHN 1992.1058, 94.5 mm, Sungai Mentaya near Sampit, Kalimantan Tengah, 10 June 1992, G. Lucas.

Diagnosis. — A large, deep-bodied species, with very steep, straight predorsal profile; second anal fin spine greatly enlarged, more so than in any other Asian freshwater ambassid; gill rakers on first gill arch 27-29; dorsal and anal branched fin rays 10-11; predorsum fully scaled; cheek with 9-10 scale rows; scales in lateral series 43-46; no humeral spot; vertebrae 10+14 = 24.

Serration. — 94.5-mm specimen from Mentaya: Preorbital edge 11 serrae, ridge no major serra 8 small serrae; preopercular edge 17 strong serrae on horizontal limb and 3 just above angle, vertical limb otherwise non-serrate; preopercular ridge 12 serrae on lower limb plus 3 just above angle, vertical limb otherwise non-serrate; supraorbital entire anteriorly, 7

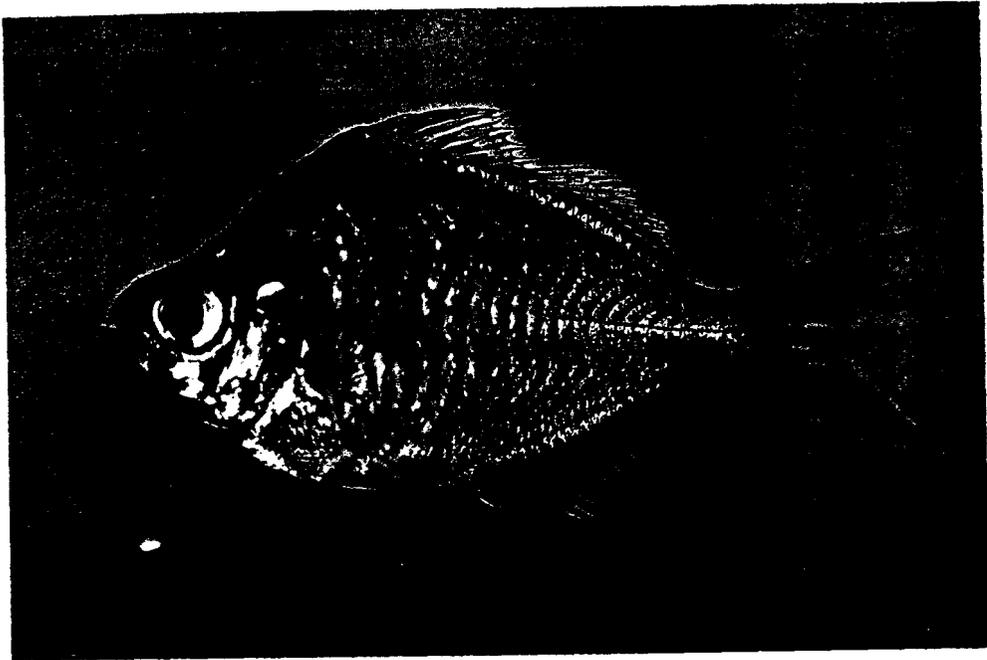


Figure 9. *Parambassis vollmeri*, 55.5 mm, Menam Moei (holotype).

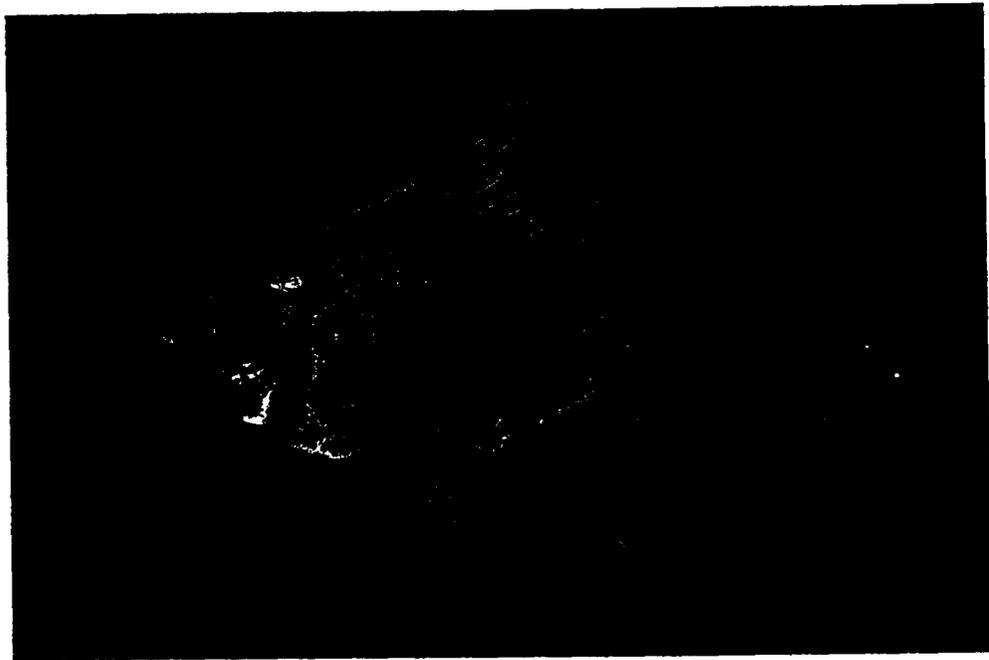


Figure 10. *Parambassis wolffii*, 93.5 mm, Sungai Mentaya.

weak serrae posteriorly starting over posterior part of eye; suborbital margin irregular, but non-serrate; interopercle with 12 strong serrae; shoulder girdle non-serrate.

Distribution. — *Parambassis wolffii* is distributed discontinuously in mainland and insular Southeast Asia. On the mainland it is known only from the Chao Phraya and Mekong basins, and evidently is absent from the entire Malay peninsula. In the islands it is known from Sumatra (Palembang) and Borneo (Kapuas, Mentaya, Barito, Kahajan). A record from Baram River by WEBER & DE BEAUFORT, 1929: 402 is doubtful.

ACKNOWLEDGMENTS

The author especially wishes to thank Francine Berkowitz, Office of International Programs, Smithsonian Institution, for arranging trips to Nepal, India, and Myanmar during which many of the specimens reported in this paper were collected. Special thanks for long continued support are due also to Ira Rubinoff, Ross Simons, and Frank Talbot of the Smithsonian. Fieldwork in India was facilitated by Madhav Gadgil, Bangalore Institute of Science, and Kaza Rama Rao of the Zoological Survey of India. Fieldwork in Thailand was done with the permission of the National Research Council of Thailand. Gene Lucas, aquarist and *Betta* enthusiast, organized a collecting trip to Kalimantan Tengah. Visits to the Zoological Research Collections of the National University of Singapore were facilitated by Peter Ng, Kelvin Lim, and Yang Chang Man. Kelvin Lim brought to my attention specimens from Pahang he had identified as *Parambassis apogonoides*. Martin van Oijen and Kos van Egmont facilitated my work in Leiden, as did Oliver Crimmen, Patrick Campbell, and Gordon Howes in London. Radiographs were prepared by Jeanine Abel in Paris, Eugenie Böhlke in Philadelphia, and Dave Catania in San Francisco.

Most of the research and writing of the paper was done in the Laboratoire d'Ichtyologie, Muséum National d'Histoire Naturelle, and Department of Ichthyology, California Academy of Sciences. I thank Marie-Louise Bauchot, Roland Billard, Martine Desoutter, Guido Dingerkus, Guy Duhamel, and Jean-Claude Hureau in Paris and Tomio Iwamoto, William N. Eschmeyer and Dave Catania in San Francisco. Funding was provided by the Smithsonian Institution, Smithsonian Tropical Research Institute, Institute for Biological Exploration, and Committee for Research and Exploration of the National Geographic Society (grant 5141-93).

REFERENCES

- ALLEN, G. R. 1982. *Parambassis altipinnis*, a new species of freshwater glassfish from western New Guinea. *Bull. Zool. Mus. Univ. Amsterdam* 8: 165-169.
- BLEEKER, P. 1851a. Bijdrage tot de kennis der ichthyologische fauna van Borneo, met beschrijving van 16 nieuwe soorten van zoetwatervisschen. *Nat. Tijds. Ned. Ind.* 1: 1-16.
- BLEEKER, P. 1851b. Vierde bijdrage tot de kennis der ichthyologische fauna van Borneo, met beschrijving van eenige nieuwe soorten van zoetwatervisschen. *Nat. Tijds. Ned. Ind.* 2: 193-208.
- BLEEKER, P. 1853. Nalezingen op de ichthyologische fauna van Bengalen en Hindostan. *Verh. Batav. Genootsch. Kunst. Wet.*, 25: 1-164, 1 pl.
- BLEEKER, P. 1857. Tiende bijdrage tot de kennis der ichthyologische fauna van Borneo. *Visschen van de rivieren*

- Barito, Kahajan en Kapoeas. *Act. Soc. Sci. Indo-Neerl.* 2: 1-21.
- BLEEKER, P. 1874. Révision des espèces d'*Ambassis* et de *Parambassis* de l'Inde archipélagique. *Nat. Verh. Holl. Maatsch. Wetensch.*, 3. Verz. II, no. 2: 83-106.
- BLYTH, E.J. 1861. Report on some fishes received chiefly from the Sitang River and its tributary streams. *J. Asiatic Soc.*, Calcutta, 29[1860]: 138-174.
- BOESEMAN, M. 1957. On a collection of east Asian fishes. *Zool. Med.* 35: 69-78, pl. 3.
- CASTELNAU, F.L. 1878. Notes on the fishes of the Norman River. *Proc. Linn. Soc. New South Wales* 3: 41-51.
- COLLETTE, B.B. 1977. Epidermal breeding tubercles and bony contact organs in fishes. *Symp. Zool. Soc. London* 39: 225-268.
- CUVIER, G., AND A. VALENCIENNES. 1828. *Histoire naturelle des Poissons*, vol. 2. Paris. xxi+490 pp., pls. 9-40.
- DAY, F. 1865a. On the fishes of Cochin, on the Malabar coast of India. *Proc. Zool. Soc. London* 1865 (pt. 1): 558-565.
- DAY, F. 1865b. *The fishes of Malabar*. London, Bernard Quaritch. xxxii+293 pp., 20 pls.
- DAY, F. 1870. Notes on some fishes from the western coast of India. *Proc. Zool. Soc. London*, 1870: 369-374.
- DAY, F. 1875. *The fishes of India; being a natural history of fishes known to inhabit the seas and fresh waters of India, Burma, and Ceylon*. London. Part 1: 1-168, pls. 1-40;
- FOWLER, H.W. 1937. Zoological results of the third de Schauensee Siamese expedition. Part 8. Fishes obtained in 1936. *Proc. Acad. Nat. Sci. Philadelphia*, 89: 125-264.
- FOWLER, H.W., AND B.A. BEAN. 1930. The fishes of the families Amiidae, Chandidae, Duleidae, and Serranidae, obtained by the United States Bureau of Fisheries Steamer "Albatross" in 1907 to 1910, chiefly in the Philippine Islands and adjacent seas. *Bull. U. S. Natl. Mus.* 100 (1), ix+334 pp.
- FRASER-BRUNNER, A. 1955. A synopsis of the centropomid fishes of the subfamily Chandinae, with description of a new genus and two new species. *Bull. Raffles Mus.* 25: 185-213.
- GUHA, S., AND P.K. TALWAR. 1983. On the type specimens of *Ambassis notatus* Blyth, 1861 (Pisces: Ambassidae), with a redescription of the species. *Bull. Zool. Surv. India* 5: 15-19.
- GÜNTHER, A. 1859. *Catalogue of the fishes in the British Museum. Vol. 1. Catalogue of the acanthopterygian fishes in the collection of the British Museum. Gasterosteidae, Berycidae, Percidae, Aphredoderidae, Pristipomatidae, Mullidae, Sparidae*. London. xxxi+524 pp.
- HAMILTON, F. 1822. *An account of the fishes found in the river Ganges and its branches*. Edinburgh and London. Text vii+405 pp., Atlas 39 pls.
- HORA, S.L. 1923. On a collection of fish from Siam. *J. Siam Soc., Nat. Hist. Suppl.* 6: 143-184, pls. 10-12.
- HORA, S.L. 1929. An aid to the study of Hamilton Buchanan's "Gangetic Fishes", *Mem. Indian Mus.*, 9: 169-192, pls. 13-23.
- KOTTELAT, M. 1989. Zoogeography of fishes from Indochinese inland waters with an annotated check-list. *Bull. Zool. Mus. Univ. Amsterdam* 12: 1-56.
- MCCLELLAND, J. 1842. On the fresh-water fishes collected by William Griffith, Esq., F.L.S. Madras Medical Service, during his travels under the orders of the Supreme Government of India from 1835 to 1842. *Calcutta J. Nat. Hist.* 2: 560-589, pls. 4-6, 15, 18, 21.
- ROBERTS, T.R. 1989. The freshwater fishes of western Borneo (Kalimantan Barat, Indonesia). *Mem. California Acad. Sci.* 14, xii+210 pp.
- SMITH, H.M. 1945. The freshwater fishes of Siam, or Thailand. *Bull. U.S. Nat. Mus.* 188.
- TALWAR, P.K., AND A. G. JHINGRAN. 1992. *Inland fishes of India and adjacent countries*. 2. A.A. Balkema, Rotterdam.
- VAILLANT, L. 1875. Remarques sur la famille des Bogodini, Bleeker. *Bull. Soc. Philom. Paris* (6)12: 32-34.
- VAILLANT, L. 1893. Contribution a l'étude de la faune ichthyologique de Bornéo. *Nouv. Arch. Mus. Hist. Natl. Paris* (3) 5: 23-114, 2 pls.
- VOLZ, W. 1903. Neue Fische aus Sumatra. *Zool. Anz. (Leipzig)* 26: 553-559.
- WEBER, M., AND L.F. de BEAUFORT. 1929. *The fishes of the Indo-Australian archipelago*. 5. E.J. Brill, Leiden. xiv+458 pp.
- WILEY, M.L., AND B.B. COLLETTE. 1970. Breeding tubercles and contact organs in fishes: their occurrence, structure, and significance. *Bull. Amer. Mus. Nat. Hist.* 143 :143-216.